

Appl. No. : 10/623,482
Filed : July 18, 2003

REMARKS

In the final Office Action mailed November 27, 2006, the Examiner rejected all previously pending claims (Claims 1-12, 14-22, 38-41, 43-56 and 105-106). In the present Amendment and Response to Final Office Action, Applicants have cancelled Claims 1-2, 4-12 and 14-22 in order to reduce issues on appeal. Applicants respectfully request full consideration of the remarks contained herein. Claims 38-41, 43-56, 105 and 106 are currently pending.

Rejections Under 35 U.S.C. §103

The Examiner has rejected Claims 1-12, 14-22, 38-41, 43-56, 105 and 106, as being obvious over U.S. Patent Application Publication No. 2003/0059535 (Luo *et al.*) in view of U.S. Patent No. 6,252,295 (Cote *et al.*), so-called "Admitted Prior Art" or U.S. Patent No. 6,503,846 (Niimi *et al.*), and further in view of U.S. Patent No. 4,363,828 (Brodsky *et al.*). The Examiner has asserted that Luo *et al.* teaches the general features of independent Claim 38, including deposition under mass transport limited conditions, but does not teach using trisilane. Cote *et al.* is asserted to satisfy this deficiency. Brodsky *et al.* is asserted to provide a motivation to combine the trisilane disclosed by Cote *et al.* with the process of Luo *et al.* "Admitted Prior Art" and Niimi *et al.* are asserted to disclose features of various dependent claims.

As discussed further below, Applicants respectfully submit that the claims distinguish the art of record.

A. The Rejections of Claims 1-12 and 14-22 Are Moot

While Applicants do not acquiesce in the Examiner's assertions regarding Claims 1-12 and 14-22, Applicants have nevertheless cancelled those claims to simplify the issues and to expedite the present prosecution. Consequently, the rejections of Claims 1-12 and 14-22 are moot.

B. The Examiner Has Asserted that Luo *et al.* Inherently Teaches Mass Transport Limited Deposition Conditions

Regarding independent Claim 38, Applicants argued in the Amendment and Response to Office Action mailed on September 6, 2006 that the art of record does not explicitly teach or

Appl. No. : 10/623,482
Filed : July 18, 2003

suggest that depositing a silicon layer using trisilane is “performed under mass transport limited deposition conditions,” in combination with the other limitations of that claim. In response, the Examiner has asserted that Luo *et al.* teaches mass transport limited deposition because Luo *et al.* teaches deposition of a silicon layer at 500°C.

Initially, Applicants note that Luo *et al.* does not *explicitly* teach mass transport limited deposition conditions. Thus, it appears that the Examiner has asserted that Luo *et al.* inherently teaches mass transport limited deposition conditions by teaching a particular deposition temperature, *i.e.*, 500°C.

C. Lou *et al.* Does Not Inherently Teach Mass Transport Limited Deposition Conditions

Applicants respectfully submit, however, that Luo *et al.* does not inherently teach mass transport limited deposition conditions. Rather, Applicants submit that the Examiner has misinterpreted the term “mass transport limited deposition conditions.” The skilled artisan will understand that, under such conditions, silicon is deposited at a “rate that is controlled primarily by the rate at which it is delivered to the substrate surface” and that process parameters are chosen such that “deposition rates are essentially independent of temperature.” *See, e.g.*, the Application p. 21. While temperature may be one parameter which is set to achieve mass transport limited deposition conditions, the skilled artisan will understand that it is not the only parameter. The skilled artisan will understand that deposition at some temperatures, in a reaction chamber with a very small volume and at a high flow rate of reactant into the reaction chamber, may result in an oversupply of reactant into the reaction chamber, such that the deposition rate is *not* limited by the rate at which the reactant is delivered to the substrate surface. Thus, the skilled artisan will understand that to achieve deposition at a rate that is controlled primarily by the rate at which a reactant is delivered to the substrate surface, the volume of the reaction chamber and the system used to provide the reactant into the reaction chamber is taken into account, in addition to the flow rate of the reactant, the dilution of the reactant with carrier gas, etc. In view of Luo *et al.*’s silence regarding setting each and every deposition parameter entailed in mass transport limited deposition, Applicants respectfully submit that Luo *et al.* does not inherently teach mass transport limited deposition conditions.

Appl. No. : 10/623,482
Filed : July 18, 2003

D. Even If Luo *et al.* Inherently Teaches Mass Transport Limited Deposition Conditions For Silane and Disilane, Lou *et al.* Does Not Teach Mass Transport Limited Deposition Conditions For Trisilane

However, even assuming, *arguendo*, that Luo *et al.* inherently teaches mass transport limited deposition conditions for its disclosed reactants, Applicants submit that Luo *et al.* does not teach mass transport limited deposition conditions for trisilane. As noted by the Examiner, Luo *et al.* does not teach using trisilane. Rather, Cote *et al.* is asserted to satisfy this deficiency. As a result, since Luo *et al.* is simply silent regarding trisilane, Luo *et al.* does not inherently teach mass transport limited deposition conditions for trisilane at all.

The skilled artisan will understand that, in the case of reactants, such as trisilane, which are liquids at room temperature, the method of delivery of the reactant, such as vaporization in a bubbler, must be appropriately set. This may entail, *inter alia*, selection of a bubbler temperature and a carrier gas flow rate through the bubbler. Applicants note that Luo *et al.* is silent regarding conditions for delivering trisilane into a process chamber.

E. Luo *et al.* Does Not Suggest Mass Transport Limited Deposition Conditions For Trisilane

Moreover, Luo *et al.* does not suggest a combination with trisilane in which conditions are adjusted to achieve mass transport limited deposition. As noted above, Luo *et al.* does not *explicitly* teach nor recognize the benefits of mass transport limited deposition conditions, for trisilane or any other reactant. Even if Luo *et al.* *inherently* teaches mass transport limited deposition conditions, however, it is well-established that obviousness cannot be established by inherency; “[t]hat which may be inherent is not necessarily known. Obviousness cannot be predicated on what is unknown.” *In re Newell*, 13 U.S.P.Q.2d 1248, 1250 (Fed. Cir. 1989).

F. Summary

In summary, Applicants note that Luo *et al.* contains no *explicit* teaching that mass transport limited conditions should be used in its process. Nevertheless, the Examiner appears to have asserted that Luo *et al.* *inherently* teaches mass transport limited deposition conditions by teaching deposition at 500°C. Luo *et al.*, however, does not inherently teach mass transport

Appl. No. : 10/623,482
Filed : July 18, 2003

limited deposition, since Luo *et al.* does not address all parameters entailed by mass transport limited deposition, as discussed above. Even assuming, *arguendo*, however, that Luo *et al.* inherently teaches mass transport limited deposition conditions for its particular reactants, Luo *et al.* is silent regarding deposition conditions for trisilane. Given this silence, Luo *et al.* does not inherently teach mass transport limited deposition for trisilane, since Luo *et al.* does not teach process parameters for trisilane at all, nor does Luo *et al.* teach or recognize the advantages of mass transport limited deposition. Moreover, even if Luo *et al.*'s conditions might result in mass transport limited deposition for trisilane, it is well-established that obviousness cannot be founded on an asserted inherent teaching. Rather, obviousness must be supported by "clear and particular" evidence. See *In re Dembiczak*, 50 U.S.P.Q.2d 1614 (Fed. Cir. 1999). As a result, Applicants submit that Luo *et al.* does not teach or suggestion mass transport limited deposition conditions in combination with the other limitations of Claim 38, and the other art of record does not satisfy this deficiency. Thus, Applicants respectfully submit that the art of record, including Luo *et al.*, Cote *et al.* and Brodsky *et al.* does not render obvious independent Claim 38 or its dependents.

Accordingly, Applicants respectfully submit that the pending claims are allowable over the art of record. Furthermore, any remarks in support of patentability of one claim should not be imputed to any other claim, and any remarks based on a portion of a claim should not be taken as founding patentability on that portion. Rather, it is intended that patentability rests on the claim as a whole. Moreover, any such remarks which do not quote the claim portion verbatim should not be used to vary the meaning of the claim, as such are intended as a convenience to improve readability.

If not expressly addressed herein, Applicants respectfully traverse each of the Examiner's rejections and assertions as to what the prior art shows or teaches, alone or in combination. Although amendments and cancellations have been made, no acquiescence or estoppel is or should be implied hereby. Rather, such have been made to expedite prosecution and are without prejudice to assertion of such subject matter in future applications.

Appl. No. : 10/623,482
Filed : July 18, 2003

CONCLUSIONS

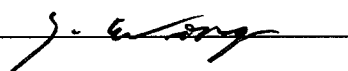
In view of the foregoing remarks, Applicants submit that the application is in condition for allowance and request the same. If some issue remains that the Examiner feels may be addressed by Examiner's amendment, the Examiner is invited to call the undersigned for authorization.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: 1/25/07

By: 
Zi Y. Wong
Registration No. 58,410
Attorney of Record
Customer No. 20,995
(415) 954-4114

3190357
120706